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## Effects of physical therapy on patients with Kashin-Beck disease in Tibet

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**Abstract** A clinical trial of physical therapy treatment for patients suffering from Kashin-Beck disease (KBD) has been carried out in Tibet. One-hundred and thirty-five patients with Kashin-Beck disease were allocated to either physical therapy (72 patients) or prescription of multivitamins (63 patients). The patients were followed for 4 years. This study suggested a beneficial effect of physical treatment.

**Résumé** Un traitement de kinésithérapie a été proposé à des patients souffrant de la maladie de Kashin-Beck (KBD) au Tibet. 135 patients souffrant de la maladie de Kashin-Beck ont été suivis durant 4 ans. 72 d'entre eux ont bénéficié d'un traitement de kinésithérapie tandis que 63 patients n'ont reçu que des multivitamines. Les conclusions de cette étude suggèrent un effet bénéfique du traitement de kinésithérapie.

### Introduction

Physical therapy treatment was initially started at the initiative of Médecins Sans Frontières (MSF) on an empirical basis in an attempt to improve the mobility and re-

duce pain in patients with Kashin-Beck disease (KBD), before the development of major deformity [2]. After encouraging initial results within the 1st year it was decided to proceed to a formal clinical trial, which was undertaken between March 1993 and February 1997. The aim was to study the effects of physical therapy on the clinical signs and evolution of the disease.

### Materials and methods

The population which was studied ( $n=135$ ) was living in three communities (Lingkang, Shume, Shubu) in one valley of Nyemo county, which is part of the Lhasa prefecture in the Tibet Autonomous Region. The prevalence of KBD in this valley is 11.8%. The patients were enrolled into the study with informed consent by the local community doctor. The clinical diagnosis of KBD was made by the MSF physiotherapist on the basis of clinical criteria previously described [3]. Patients attending the Lingkang community clinic were assigned as the control group ( $n=63$ ). They did not have physical treatment but received multivitamins as motivation to reattend for examination. Patients attending the Shume and Shubu clinics were assigned as the treated group ( $n=72$ ), and they received a physical therapy treatment programme. Groups were constituted in order to respect the same environmental conditions. They were distant enough from each other to prevent any influence.

Patients were asked which joints they wished treated. The physical therapy treatment concentrated on functional recovery of movement of the joints, and included massage followed by active and passive mobilisation and pressotherapy. The patients were encouraged to repeat the active exercises twice a day at home. The treatment lasted for 15–20 min and was carried out by the community doctor. The patients attended twice a week. Range of movement was recorded using a goniometer. Pain and daily activities were recorded by a questionnaire. Joint deformities, joint circumferences and limb length were also recorded. Routine muscle testing was recorded by the MSF physiotherapist. Measurements were recorded at enrollment and repeated 1 month later, just prior to the start of the physical therapy treatment. The mean of these first two measurements was used as the initial status of the joint at the beginning of the study. During treatment further evaluation was performed after every five physical therapy sessions. After the treatment and during the follow-up, the measures were taken every two months.

A pain score was used. At each evaluation of the joint concerned, the patient reported the presence or absence of pain and how the pain compared with that at the last examination. A first

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sub-score was established by multiplying the number of positive answers and dividing by the number of checks. A second sub-score was calculated with the sum of the pain values divided by the number of checks. The final score was established by multiplying the first and second sub-scores minus two (as two represented no change in the evolution of pain). Thus a score of zero signified no change in pain level. A positive score signified more pain and a negative score less pain. The changes in range of movement and in pain score at different time intervals were compared between the treated and controlled groups with analyses of variance for repeated measures (time) with a between group factor.

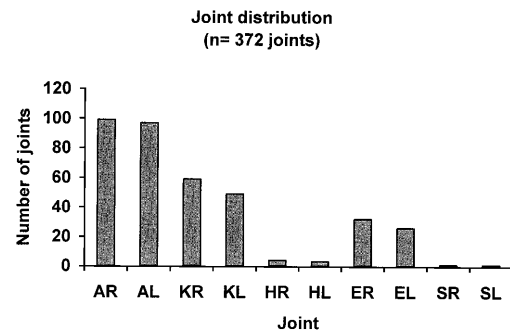
Data entry and statistical analyses were carried out with EPI-INFO and SPSS (version 8.0) software packages.

## Results

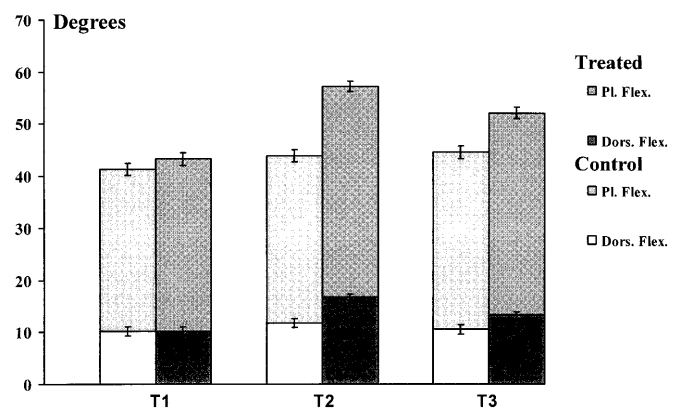
A total of 135 patients suffering from KBD were enrolled into the study. After a 4-year period, 126 patients remained. Six were lost to follow-up and three had died from unrelated causes. The sex distribution showed a preponderance of females, but did not differ between the treated and the controlled groups ( $P=0.993$ ). There was no difference in the age distribution between the two groups, one-fifth were below 15 years of age. The staging of the disease in this group has already been presented [3]; the stages related to age, the younger patients mainly being stage I and the older being stage III. The majority of cases were stage II. The proportion of patients with different stages of disease in each group was not significantly different.

In the 135 patients, 372 joints were studied. Ankles represented 52.7%, knees 29.3% and elbows 15.6% (Fig. 1). The following results refer to the largest group of joints: ankles ( $n=173$ ). Among this group, 97 ankle joints were treated with physical therapy and 76 were not. The mean duration of physical therapy treatment was 6.5 months ( $SE=0.25$ ). The length of the treatment did not vary according to sex ( $P=0.814$ ), or age ( $P=0.884$ ), but depended on the degree of joint involvement ( $P=0.047$ ). The mean follow-up period was 35.6 months ( $SE=1.28$ ).

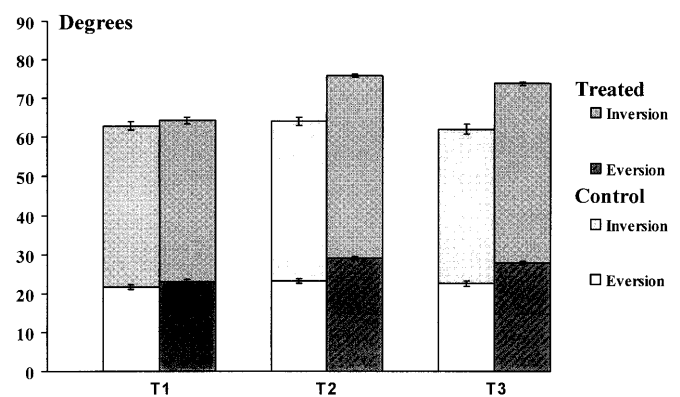
Movement at the ankle joint occurs in four planes: plantarflexion, dorsiflexion, inversion and eversion. Figures 2 and 3 show that at the beginning of the study ( $T1$ ) the mean range of each movement is similar in the control as in the treated groups. Immediately after the physical therapy treatment ( $T2$ ), the range of movement in the treated group improved. The difference is statistically highly significant for movement in each plane ( $P<0.001$ ). At the end of the study ( $T3$ ), the difference between the two groups is slightly less, but still significant ( $P<0.001$ ). The ankle joints of the treated group had lost a few degrees of movement in each plane but the range remained increased when compared with the initial recordings. When comparing the measurements at the different times, there was an increase in range of movement in the treated group from the beginning of the study to the end of the treatment period as well as at the end of the follow-up period. There was no improvement between the end of the treatment period and the end of



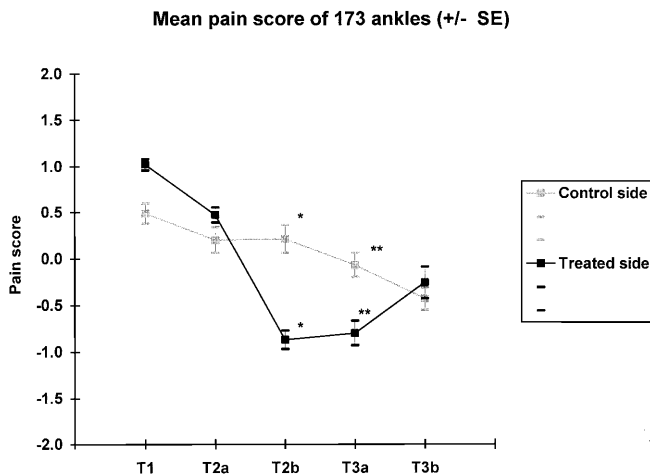
**Fig. 1** The distribution of studied joints ( $n=372$ ) in 135 patients in Nyemo County, Lhasa Prefecture, Tibet Autonomous Region (AR right ankle; AL left ankle; KR right knee; KL left knee; HR right hip; HL left hip; ER right elbow; EL left elbow; SR right shoulder; SL left shoulder)



**Fig. 2** Mean angle of dorsal and plantar flexion ( $\pm SE$ ) in 173 ankles at the beginning of the study ( $T1$ ), at end of the treatment ( $T2$ ), and at end of study ( $T3$ ). Nyemo County, Lhasa Prefecture, Tibet Autonomous Region



**Fig. 3** Mean angle of inversion and eversion ( $\pm SE$ ) in 173 ankles at the beginning of the study ( $T1$ ), at end of the treatment ( $T2$ ), and at end of study ( $T3$ ). Nyemo County, Lhasa Prefecture, Tibet Autonomous Region



**Fig. 4** Mean pain score of studied ankles ( $\pm$ SE;  $n=173$ ; \* and \*\*:  $P<0.001$ ). Nyemo County, Lhasa Prefecture, Tibet Autonomous Region

the study. In the control group there was no significant change in the range of movement at any time. Similar results were observed for the elbow and knee joints.

The mean period of treatment was 6.5 months. This period did not depend on sex or age but did depend on the degree of joint involvement. The more severely the joint was involved, the longer was the period of treatment. The mean period of follow-up was 35.6 months. There was a significant difference in the pain scores between the two groups at the beginning of the study ( $P<0.001$ ; Fig. 4). It is not possible to explain this observation. Pain decreased during the second half of the period of treatment and the beginning of the follow-up period. This is highly significant when compared to the control group (T2b and T3b:  $P<0.001$ ). It stabilised at the end of the study period. The pain scores in the control group also decreased a little during the study period, but more gradually.

Secondary clinical signs were also observed [3]. Tiredness, weakness, muscle atrophy and gait were studied. There was no difference in these signs between the two groups, nor a difference between the time periods within the study. The patients in the control group reported feeling less tired at the end of the study ( $P<0.05$ ).

## Discussion

Upon enrollment into this study each patient chose the joints which they wished treated, depending on their

symptoms. The joint distribution indicates that weight-bearing joints present the most significant symptoms. The improvement in the mobility of the joints after physical therapy shows how these may be helped. It is reasonable to suggest that the earlier the treatment starts, the better the results will be. The benefits of treatment seem to decrease with the passage of time. It is likely that the patients who do not exercise well by themselves in order to retain movement and may need a long-term physical therapy programme. Treatment needs to last for some time in order to ensure relief of pain. The pain seems to increase during spring and autumn. This could simply be due to weather conditions as with osteoarthritis, or to the fact that farmers perform heavy manual work with ploughing, sowing and irrigating in the spring, and harvesting in the autumn. Treatment may therefore be required throughout the year. Progressive decrease in pain was seen in the control group. This could be due to the intake of multivitamins or to the psychological effect of enrollment into the study and regular medical review. The physical therapy treatment seems to have no effect on secondary clinical signs. The proposed treatment is not, however, directed towards these signs but to the functional recovery of joint mobility. The affected population includes farmers doing heavy manual labour.

In conclusion, physical therapy is important in the treatment of patients suffering from Kashin-Beck disease. It can relieve pain, improve mobility and thus improve the socio-economic status of patients. At present there is no therapy available to these patients, other than traditional remedies [1, 4] or surgery in advanced cases [2]. No study of traditional remedies has been undertaken. The physical therapy treatment uses simple techniques and is easy to learn. No sophisticated equipment is required.

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